Nov. 26, 1935. C. A. WEBBER 2,022,066

GAS BURNER

Filed Aug. 25, 1933 2 Sheets-Sheet 1

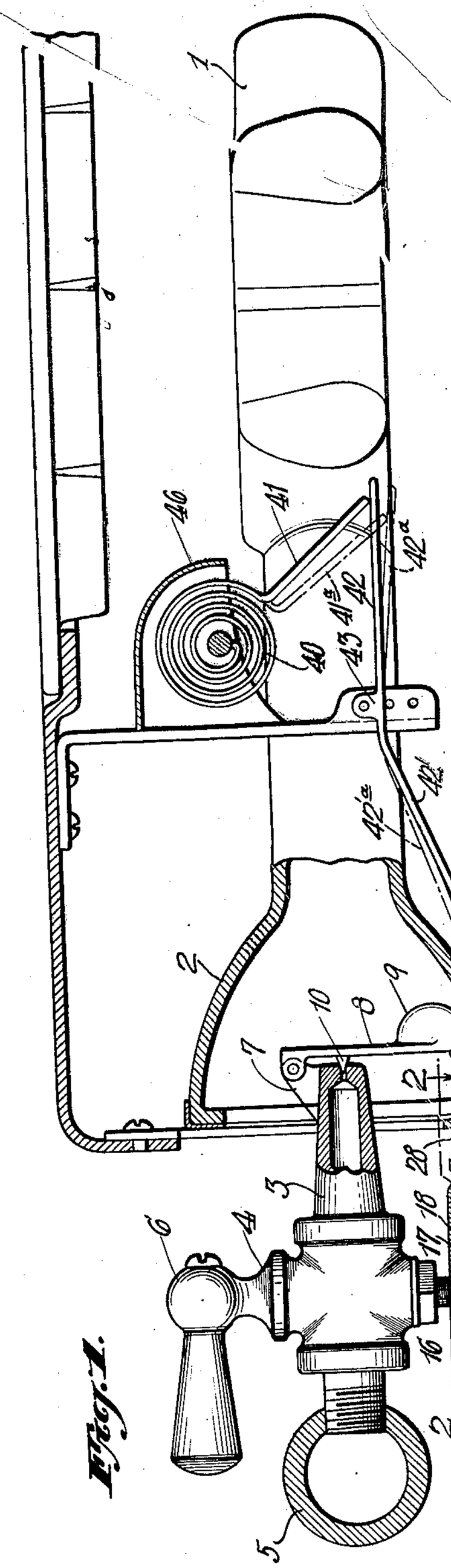

Fig. 1.

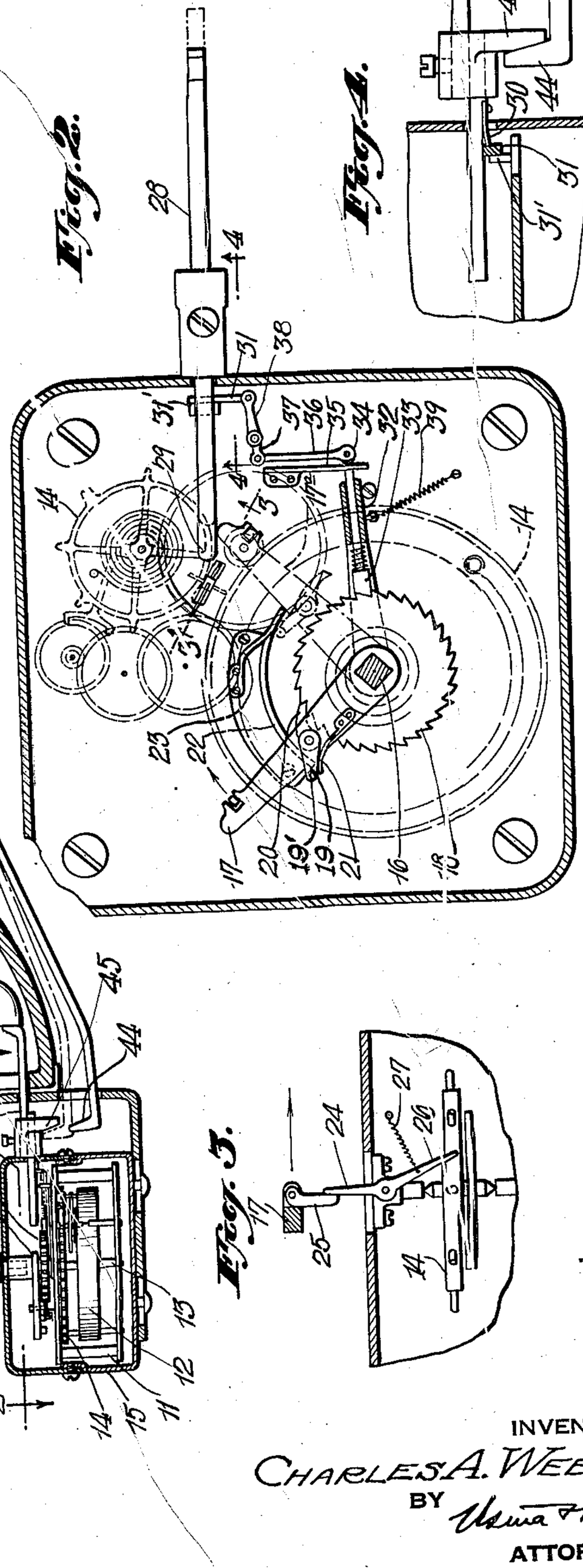

Fig. 2.

Fig. 4.

Fig. 3.

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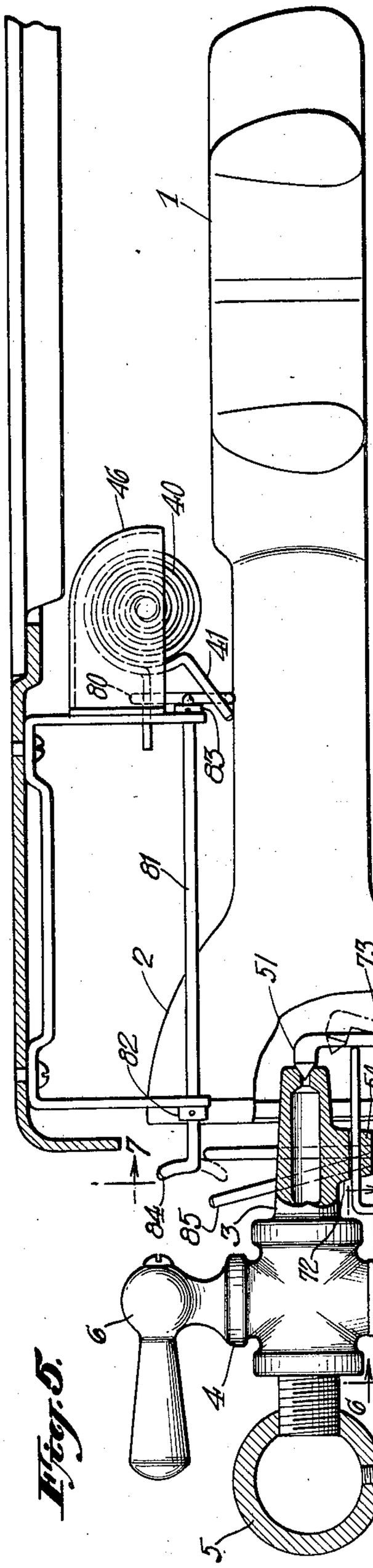

Fig. 5.

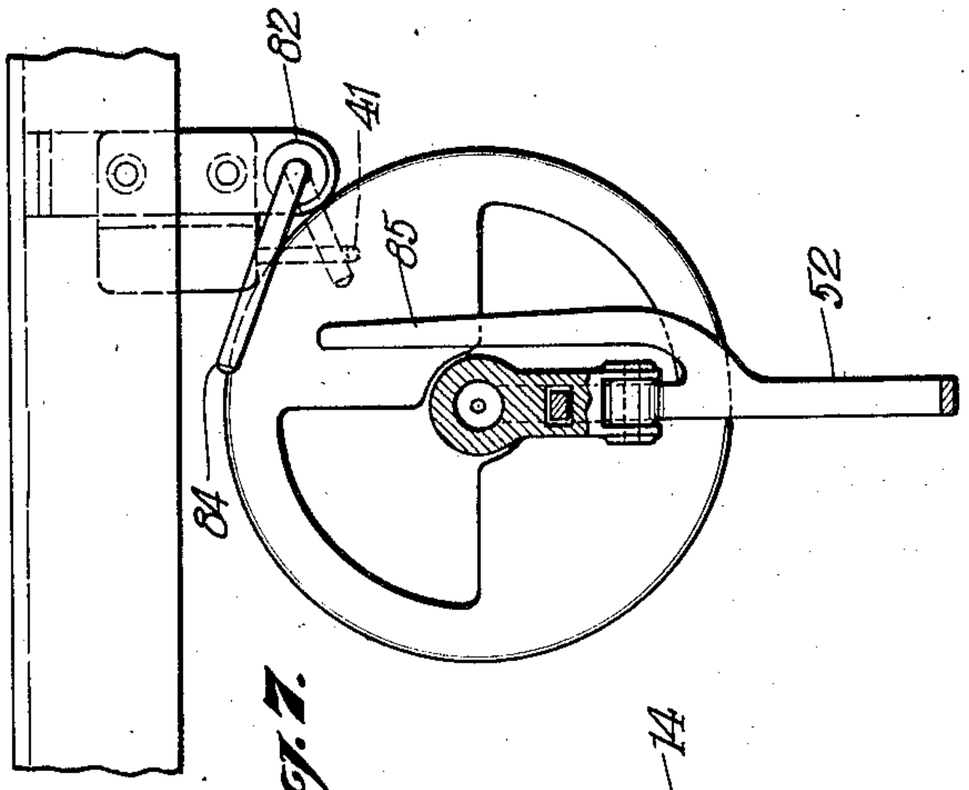

Fig. 7.

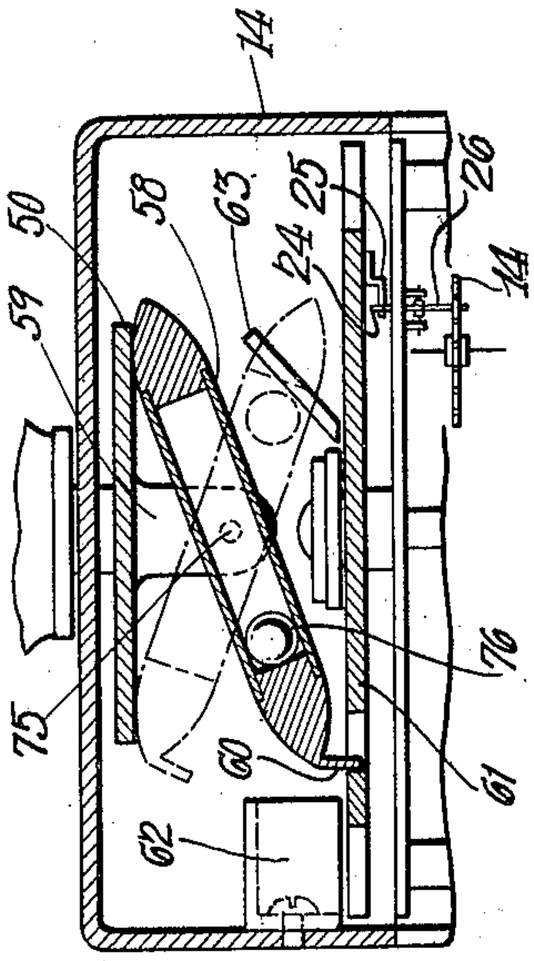

Fig. 6.

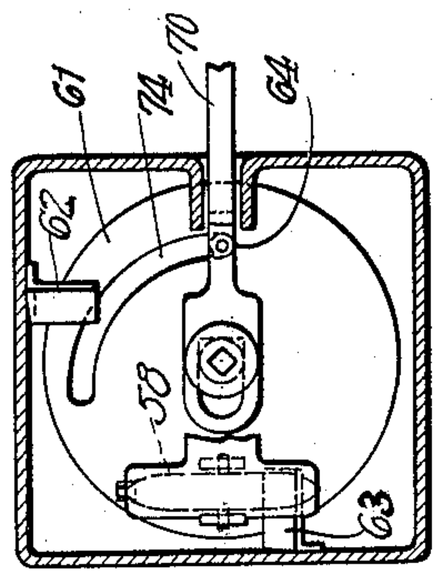

Fig. 8.

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2,022,066

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Application August 25, 1933, Serial No. 686,695

7 Claims. (Cl. 158—117.2)

This invention relates to gas burners. One of the objects of the present invention is to provide means to automatically shut-off the flow of gas into said burner when the gas flowing through the burner openings thereof is unignited for one reason or another.

Another object of the present invention is to provide means to automatically shut-off the gas supply to the burner at the conclusion of a determined time interval.

Another object of the present invention is to provide means controlled by a thermally responsive element positioned adjacent the burner openings of said burner to prevent the operation of said automatic shut-off means at the conclusion of the determined time interval, if the gas flowing from the burner is ignited, the said means being inoperative to so prevent said automatic shut-off means, if the gas is not ignited.

Still another object of the present invention is to provide an improved safety burner for gas stoves and the like.

Other objects and advantages will become apparent as the invention is more fully disclosed.

In accordance with the objects of the present invention, I have devised an improved safety burner in which means are provided to automatically shut-off the gas flow to the said burner at the conclusion of a determined time interval from the time of initiating the gas flow, which means is rendered inoperative to shut-off said gas flow by means controlled by a thermally responsive element positioned adjacent the burner outlet openings and in thermal relationship thereto while the gas flowing through the said burner openings is ignited, which thermally responsive means is inoperative to shut-off said gas flow if the gas flowing through said burner openings fails to ignite or subsequent to ignition is extinguished from any cause whatsoever. The present invention contemplates two specific embodiments of the broad idea involved.

In one specific embodiment of the present invention the automatic time controlled gas shut-off means of the present invention comprises a pivoted end closure member positioned to fall by gravity in an end closing position across the gas outlet opening of the usual type of gas supply nozzle of a burner, and clock controlled means adapted to be energized by a turning of a valve controlling the flow of gas through said nozzle, to deflect the said end closure member from an end closing position and to permit its return to said end closing position at the conclusion of a determined time interval.

In combination with this automatic time controlled gas shut-off means, I provide means controlled and operated by a thermally responsive element positioned adjacent the gas outlet openings of said burner and in thermal relationship therewith, to prevent the return of said end closure member to an end closing position at the conclusion of said determined time interval, while the gas from said burner is ignited, which means operates to release said member to return to an end closing position when and if the gas is subsequently extinguished.

In a second specific embodiment the automatic time controlled gas shut-off means comprises a conical plug member located upon the end of a bell crank device, the opposite end of which is weighted to maintain the conical plug in a position sealing the outlet opening of a gas supply nipple to a gas burner. This arrangement provides for a better clearing of the gas outlet opening of the gas supply nipple than the arrangement of elements in my first specific embodiment. In combination with this bell crank device I provide a clock mechanism operatively connected to be energized by a turning of the handle of the valve controlling the entrance of gas to the said nipple and provide also means to displace the said plug member from an end closing on the said nipple simultaneously with the turning of the said handle for a determined time interval.

In combination with this automatic time controlled gas shut-off means I also provide means as in the first specific embodiment to prevent the return of the said plug to an end closing position at the conclusion of the said time interval if the burner is ignited, said means being substantially a thermal responsive element connected by means of suitable levers to operate to prevent the return of the said plug to an end closing position, if and while the gas flowing from the burner is ignited.

I will describe the two specific modifications in detail.

Before further disclosing the nature and scope of the present invention reference should be made to the accompanying drawings, wherein—

Fig. 1 is a side elevational view partly in section of the first specific embodiment of the present invention; Fig. 2 is a view broken away in part taken along plane 2—2, Fig. 1; Fig. 3 is a view along plane 3—3, Fig. 2; Fig. 4 is a view along plane 4—4, Fig. 2; Fig. 5 is a side elevational view partly in section of the second specific embodiment of the present invention; Fig. 6 is a view of the same taken along plane 6—6 of Fig. 5;

Fig. 7 is a view along plane 7—7, Fig. 5; and Fig. 8 is a view along plane 8—8, Fig. 5.

Referring to Figs. 1 to 4 inclusive the first specific embodiment of the present invention comprises the usual type of gas range burner 1 having a gas intake port 2 into which is introduced a gas supply nipple 3 attached to valve 4 connected with main supply pipe 5. Valve 4 is turned in its seat by handle 6.

Upon the gas outlet end of nipple 3, I provide flange 7 from which is pivotally suspended drop rod 8 weighted at its lower end 9 to hang normally across the outlet opening of nipple 3. Drop rod 8 is provided with a plug 10 positioned thereon to entirely close the outlet opening of nipple 3 when the drop rod 8 is in a vertically hanging position. This provides for the gravity operating gas shut-off means of the present invention.

In accordance with the objects of the present invention I provide clock controlled means to displace the gravity operating means from its gas shut-off position and to return the said gravity operating means to its gas shut-off position at the conclusion of a determined time interval, the said clock controlled means being set in operation by the opening of valve 4 by the turning of handle 6. In the specific embodiment disclosed in Fig. 1 this is accomplished by positioning a clock means 11 including a clock spring 12 with winding post 13 and balance wheel 14 which clock means is enclosed in housing 15 beneath valve 4 and connecting the winding post of the clock drive spring to the valve so that upon a rotation of the valve upon a turning of the handle 6 the winding post is also rotated and the clock spring thereby is wound up.

An ordinary one day clock spring requires 6 or 7 full turns of the winding post to fully wind up the spring. One turn therefore is sufficient for a 4 hours' run. A quarter turn is sufficient for an hour's run. The present invention contemplates a time interval of about 2 minutes and accordingly a clock spring of a size to accord with this requirement may be utilized.

It is essential however to the present invention that the connection between valve 4 and the clock spring be such that upon a turning of the valve 4 from a gas shut-off position to a full open position the clock spring be wound and the clock mechanism be set in motion, and that thereafter the valve and the clock mechanism are independently operative to the extent that the valve is not thereafter reversed upon the unwinding of the clock spring and that the valve may thereafter be reversed to cut off the gas flow in part or in whole independently of the clock mechanism and that the clock mechanism be free to operate to perform its desired function independently of the valve.

One means of accomplishing this is disclosed in the first specific embodiment of Figs. 1 to 4 inclusive.

Basically the means disclosed in Figs. 1 to 4 inclusive comprises a ratchet arrangement of elements which operates upon a turning of the valve 4 a quarter turn to rotate the clock spring winding post of the clock control mechanism to wind up the clock spring a desired amount. Means are provided to release the ratchet connection at the conclusion of the quarter turn rotation of the valve and to maintain this release position until the valve has been manually rotated in a reverse direction to the gas shut-off position whereupon the ratchet engagement of the valve and clock control means is automatically restored. As a clock mechanism normally requires agitation of a balance wheel to put it in motion, I provide trip means operative at the conclusion of the quarter turn of the valve 4 to initiate motion in the said balance wheel.

Referring to Figs. 1 and 2, housing 15 enclosing the clock mechanism 11 is preferably supported from the bottom of valve 4 with the rotating end 16 of the valve extending thereinto. To the end 16 is attached cam 17 to be rotated thereby. I then provide winding post 13 with a ratchet wheel 18 and position the axial centers of the winding post and the valve 4 in substantial alignment. On the under side of cam 17 I position pivoted lever member 19 having at one end a ratchet tooth 20 adapted to engage with ratchet wheel 18 and at the other end a roller 19′ and provide spring means 21 operating to maintain the end 20 in engagement with ratchet wheel 18. A split track 22 is provided for roller 19 to travel on.

Upon a turning of valve 4 from a gas shut-off position to full open position cam 17 is rotated to dotted line position shown as 17*a*. Ratchet wheel 18 is rotated therewith until roller 19 engages spring 23 which operates to depress roller 19 through the split track 22 thus raising tooth end 20 from engagement with ratchet wheel 18. Valve 4 then may be rotated in a reverse direction as roller 19 rides on the under side of split track 22 thus maintaining the toothed end 20 out of engagement with ratchet wheel 18 until a full gas shut-off position has been reached whereupon roller 19 rides off the end of split track 22 and spring 21 operates to return roller 19 to a position whereupon again opening the valve roller 19 rides upon the top of split track 22, meanwhile toothed end 20 has been engaged with ratchet wheel 18 substantially as indicated. The clock mechanism 11 which has been wound up by the opening of valve 4 meanwhile is free to operate independently of the valve 4.

The mere turning of valve 4 and consequent winding of spring 12 in the manner described is not sufficient to set the clock mechanism in motion. Tripper means must be provided to agitate the balance wheel 14. In the present specific embodiment this is accomplished as is disclosed in Fig. 3 by positioning a pivoted lever 24 having one arm (24) extending above the balance wheel 14 in a position to engage with an extension 25 on cam 17 and having the other arm 26 extending in a position towards the balance wheel 14 to trip the balance wheel 14 upon engagement of the arm 24 with extension 25. Spring tension means 27 is provided to maintain the tripper mechanism in an operative position. It is preferable to position the tripper mechanism at a point where it will be operated at the conclusion of the spring winding operation, substantially as shown.

In accordance with the objects of the present invention I provide means including a push rod 28 positioned substantially in the manner shown and adapted to be engaged by cam 17 to operate to displace drop lever 8 from a vertically hanging position a sufficient distance to remove plug 10 from an end closing position in nipple 3 thereby permitting gas flow through the gas outlet opening of the nipple into port 2 of burner 1. As the amount of displacement required is relatively small the end 29 of lever 28 is positioned at a point where lever 17 will engage therewith as it approaches the conclusion of a quarter turn rotation thus displacing the said end to a position indicated in dotted lines 29*a*.

When lever 28 has been thus displaced means must be provided to lock the same in the displaced position so as to permit the free reverse rotation of valve 4 to regulate the gas supply to burner 1. And further means must be provided to release the locking means at the conclusion of a determined time interval.

The lock means provided in accordance with the present invention by a simple spring clip mechanism 30 situated upon the under side of push rod 28 which is adapted to engage push rod 31 in such manner as to hold rod 28 in its displaced position.

The release means of the present invention is provided by a spring ratchet member 32 pivoted on winding shaft 13 of clock mechanism 11 having a spring controlled ratchet tooth 33 engaging ratchet wheel 18 with its opposite end 34 riding on track 35, which track 35 is disposed with respect to the ratchet wheel 18 in a position to gradually pull tooth 33 from engagement therewith as the ratchet wheel is turned in a counter-clockwise direction by the unwinding of clock spring 12. The precise time interval to obtain disengagement of tooth 33 can be regulated by means of this track 35.

The end 34 of spring ratchet 32 is connected by means of levers 36, 37 and 38 to the end of rod 31 and operated to move rod 31 out of engagement with spring clip 30. Thereupon the rod 28 is free to be moved in a reverse direction by weight 9 of drop rod 8. Spring means 39 is provided to return spring ratchet 32 to its first position.

Before the release of spring clip means 30 I have provided means actuated by a thermally responsive element 40 positioned adjacent the burner to prevent the return of drop rod 8 to an end closing position in nipple 3 if the gas flowing from the burner is ignited.

This means is most simply provided as indicated in Fig. 1 by locating the thermally responsive element 40 in heat relationship with the burner 1 and operatively connecting this element 40 with means adapted to lock the push rod 28 in its displaced position when the gas from the burner is ignited and to unlock or release the said push rod 28 when and if the gas is unignited.

In the specific embodiment shown, the thermally responsive element 40 enclosed by hood 46 is a coil of the common oven type heat indicator which is comprised of thermally sensitive metal, the coil having an extending arm 41 which upon being displaced to a position 41*a* by a twisting of the coil 40 under the influence of heat from burner 1 contacts with lever 42 pivoted at 43 thereby displacing the arm 42 thereof to position 42*a*, the other arm 42′ being similarly displaced to position 42′*a*. The end of arm 42′ is provided with a beveled face 44 adapted to engage when in displaced position 41′*a* with a reciprocal beveled faced element 45 (Fig. 4) carried by rod 28 and when engaged rod 28 is displaced sufficiently to release rod 31 of the releasing means from frictional engagement with spring 30, so that the rod 31 may be freely actuated by the said releasing means.

The push rod 28 upon the operation of the thermally controlled means is held in open position so long as the gas flowing through the burner is ignited. Upon extinguishing the flame at the burner 1 either by manual operation of the handle 6 or by accident as, for example, a falling of gas pressure, boiling over of kettle, draft of air, etc., the thermally sensitive element 40 operates to release lever 41 thereby releasing element 44 from element 45 and thus releases push rod 28 and drop rod 8 operates by gravity weight 9 to move rod 28 back to its first position and to thereby position conical plug 10 in an end closing position in nipple 3. The flow of gas to the burner 1 thereby is interrupted irrespective of the position of valve 4 or the turning of handle 6.

The second specific embodiment of the present invention is illustrated with particularity in Figs. 5 to 8 inclusive, and the elements common to both specific embodiments carry the same identifying numerals. In Fig. 5 is shown the usual front supply pipe 5 to which is attached the usual turn cock valve 4, with valve handle 6, and nipple 3 to be introduced in the usual way into the air port 2 of burner 1. Attached to the lower end 7 of the valve 4 is an arm 50 which turns with the handle 6. The gas outlet opening of the nipple 3 is closed and sealed by a pointed conical plug 51 which may be the hooked end of a bell crank device 52 swinging on a pin 53 in a flange 54 on the nipple 3 with its lower end weighted as indicated at 55. This bell crank device by gravity normally holds the plug 51 in position to seal the gas outlet opening of nipple 3.

To the front supply pipe 5 is attached in any convenient way as is indicated a simple clock movement enclosed in a box 56. This movement consists of an ordinary clock spring to be wound up by turning a winding post 57 in the usual way. This winding post 57 extends above the top of the box 56 and has attached to it an arm 61 which serves on turning to wind up the spring. On the under side of the arm 50 at its outer end is a hook pawl 58 swinging from a U-flange 59 attached to said under side of arm 50, the hook 60 of said pawl moves by gravity to engage with the arm 61 at its outer end and when the arm 50 is turned to turn on the gas this draws around the arm 61 causing it to wind up the spring. The other end of the pawl 58 as the turn of arm 50 is nearly completed is caused to be depressed by a bent pin 62 on the top of the box 56, so as to trip or release the hook 60 from the arm 61. Arm 61 on being released is free to reverse its motion as the clock work runs. A second bent hook 63 is provided which on the turning back of the arm 61 to the gas shut-off position depresses the hook end of the pawl 58 and causes the hook 60 to drop into engaging position for the arm 61.

Arm 61 is substantially circular as indicated in Fig. 8, and is provided with a slot 74 in which is engaged pin 64 on rod 70, which provides means to terminate the movement of the clock mechanism when rotation of arm 61 has brought the slot end into engagement with pin 64.

To initiate movement in the clock mechanism the usual type of balance wheel escapement mechanism is provided as indicated in Fig. 3 which is actuated by pin 25 disposed on the under side of arm 17. When arm 17 is rotated by handle 6 in turning on the gas, pin 25 trips spring lever arm 24 which moves arm 26 into engagement with one of the spokes of escapement wheel 14, thereby setting the escapement mechanism into motion and energizing the clock mechanism.

The turning of the disk shaped arm 61 serves to push a light bolt 70 towards the sealing plug 51. This bolt runs in slots 71 and 72, one on box 56 and one on flange 54. The outer end of this bolt 70 reaches to the arm 73 of bell crank 52 to push out the plug 51 from its normal end

closing position in nipple 3. Bolt 70 remains in this position until the reverse motion of the arm 61 permits the gravity weight at 51 to push it back and the plug 51 again enters and seals the outlet opening of nipple 3. The bolt 70 is controlled entirely by the movement of the arm 61 which has a slot 74 following the curve of the arm and in which a pin 64 moves inward or outward as the arm 61 is turned. The period of time which is desired as a minimum to keep the gas supply open can be predetermined and controlled by the clock movement. It should be sufficiently long to give full opportunity for the thermal control means to operate and keep the gas supply open as long as the burner is lit—ordinarily about 2 minutes will suffice.

After the gas has been turned on the handle 6 can be turned freely, back and forth, to any adjustment of the gas without in any way interfering with the clock control, except to wind the spring.

The mechanism for moving bolt 70 is illustrated in Fig. 8 in which a plane view of the top of the clock box 56 is shown with the arm 61 set on the winding post 57 of the spring of clock mechanism in box 56. Arm 61 has one end shaped as a large sector of a circle set as an eccentric on the winding post 57 with a curved slot 74 in which drops a pin 64 from the bolt 70 which slides though the slots 71 and 72. The turning of the arm 61 forces the bolt 70 either in or out.

Pawl 58 as may be noted from Fig. 6 is in the shape of a torpedo tapering at both ends. It is suspended or pivoted between two straps or a U-flange 59 extending from the bottom of arm 50 between which it is balanced on trunnions 75 at its approximate center. The interior of pawl 58 is hollow and a metal ball 76 is free to roll from end to end therein. The weight of ball 76 is sufficient to keep down the pawl end to which it rolls. The upper end of pawl 58 rests against the arm 50. As the arm 50 turns with the gas valve handle 6 to or near the end of its full quarter turn the upper end of the pawl encounters a bent pin 63 under which its point passes and the upper end thereby is gradually pressed down until the pawl tilts a sufficient amount to permit the ball 76 to roll down to that end, the hook end 60 being thus raised. The pawl held in this position permits the turning of gas valve 4 by handle 6 for any desired adjustment of the gas flow therethrough. When the gas is turned off the end of the pawl at or near the end of the turning off also encounters a second bent pin 62 and is in turn depressed and tilted down whereupon the ball 76 rolls to that end and the weight thereof is sufficient to hold the hook 60 in engagement with the arm 61.

The thermal control means of the second specific embodiment is designed to function to perform the same ultimate result as that of the first specific embodiment but in a different manner.

As in the first specific embodiment thermally responsive coil element 40 is positioned adjacent burner 1 and is provided with arm 41 which arm 41 upon movement due to heat energy emanating from burner 1 contacts with end 80 of rod 81 thereby rotating the rod in bearings 82 and 82. End 84 of rod 81 is adapted to be rotated into a position to contact with extension arm 85 of arm 52 thereby preventing the bell crank device from returning to an end closing position in nipple 3 upon the release of the push rod 70 at the conclusion of the determined time interval.

If burner 1 is not ignited the thermal control means does not operate and the bell crank device is free to operate to shut-off the gas flow at the conclusion of the determined time interval. If burner 1 subsequently is extinguished from any cause, the reverse movement of arm 41 of the thermal coil 40 operates to permit a reverse movement of rod 81 thereby releasing the bell crank device to operate to close off the gas supply from nipple 3 irrespective of whether valve 4 has been shut-off or not.

Having broadly described the present invention and disclosed two specific embodiments thereof it is apparent that many modifications and adaptations may be made from the specific embodiment without departing essentially from the nature and scope thereof, and all such modifications and adaptations are contemplated as may fall within the scope of the following claims.

What I claim is:

1. In combination, a gas burner, gravity operated means to cut off the flow of gas into said burner, time controlled means to maintain said gravity operated means in inoperative position for a determined time interval, and thermally responsive means controlling the release of said gravity means from said inoperative position at the conclusion of said determined time interval.

2. In combination, a gas burner, a supply pipe therefor, gravity operated means in said supply pipe operative to cut off the flow of gas into said burner, timing means operative on the initiation of gas flow into said burner to maintain said gravity operated means in an inoperative position for a determined time interval, and thermally responsive means in heating relationship to said burner and operative when heated to control the release of said gravity operated means at the conclusion of said determined time interval.

3. In the combination defined and claimed in claim 2, said gravity operated means comprising a plug member pivotally supported and weighted to hang vertically in an end-closing position across the gas outlet opening of said supply pipe conducting gas into said burner.

4. In the combination defined and claimed in claim 2, said timing means comprising a clock mechanism, a valve in said supply pipe, means to connect said clock mechanism with said valve whereby said clock mechanism is set in operation by the opening of said valve, a push rod means operatively connected with said valve to render inoperative said gravity operated means upon the opening of said valve during a determined time interval, and means operative at the conclusion of said determined time interval to release said push rod thereby permitting the return of said gravity operated means to its operative position.

5. In combination, a gas burner, valve controlled means to supply gas thereto, gravity operating means to shut off the gas supply on the burner side of said valve controlled means, means operating on the opening of said valve to position said gravity operating means in an inoperative position, means to maintain said gravity operated means in said inoperative position for a determined time interval, and thermally controlled means operated by the heat energy of said burner to control the release of said gravity means at and after the conclusion of said determined time interval.

6. In the combination defined and claimed in claim 2, said gravity operated means comprising a plug member adapted to seal the end of the gas supply, and a bell crank device pivotally sup-

ported and carrying said plug member in a position to normally bring said plug member into position to seal the gas outlet end of said pipe.

7. In the combination defined and claimed in claim 2, said thermally responsive means including a thermally responsive element and a lock rod, said lock rod being responsive to movement of said element to lock said gravity operating means in an open position when said burner is operating and to release said gravity operating means from said locked position when and if the said burner ceases to operate.

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